Claims

1. A method of preparing a formulation comprising an ion-conducting polymeric material, the method comprising:

(a) selecting an ion-conducting polymeric material of a type which includes:

(i) phenyl moieties;

(ii) carbonyl and/or sulphone moieties; and

(iii) ether and/or thioether moieties;

(b) selecting a solvent mixture comprising water and a first organic solvent in which mixture said ion-conducting polymeric material can be dissolved and/or dispersed;

(c) dissolving and/or dispersing said ion-conducting polymeric material in said solvent mixture;

(d) removing greater than 80% of the total amount of said first organic solvent in said solvent mixture, thereby to leave a formulation comprising said ion-conducting polymeric material dissolved and/or dispersed in a solvent formulation comprising a major amount of water.

2. A method according to claim 1, wherein said first organic solvent selected in step (b) is water miscible at 25°C and has a boiling point of less than that of water.

3. A method according to claim 1 or claim 2, wherein said first organic solvent has up to 5 carbon atoms.

4. A method according to any preceding claim, wherein said first organic solvent includes an hydroxyl, ether or carbonyl functional group.

5. A method according to any preceding claim, wherein said first organic solvent is selected from acetone, methylethylketone, ethanol and tetrahydrofuran.

6. A method according to any preceding claim, wherein said solvent mixture includes an optional second organic solvent having a boiling point which is greater than that of said first organic solvent.

7. A method according to claim 6, wherein said second organic solvent has a boiling point at atmospheric pressure which is at least 20°C greater than the boiling point of said first organic solvent.

8. A method according to any preceding claim, wherein the ratio of the wt% of water to the wt% of said first organic solvent is in the range 0.25 to 2.5.

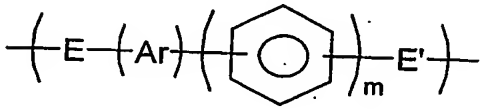
9. A method according to any preceding claim, wherein said solvent mixture of step (c) includes at least 1wt% and less than 20wt% of said ion-conducting polymeric material.

10. A method according to any preceding claim, wherein step (c) of the method is carried out at a temperature which is less than the boiling point of the solvent mixture.

11. A method according to any preceding claim, wherein after removal of the first organic solvent the solvent formulation which includes a major amount of water includes at least 10wt% and less than 30wt% of said ion-conducting polymeric material.

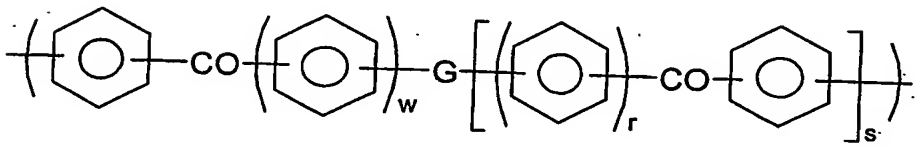
12. A method according to any preceding claim, wherein said ion-conducting polymeric material includes:

a moiety of formula



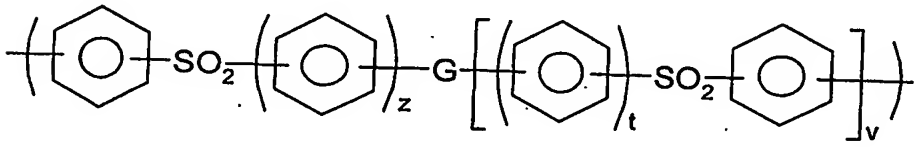
I

and/or a moiety of formula



II

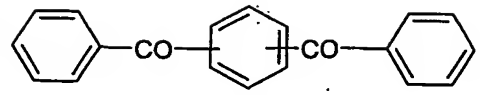
and/or a moiety of formula



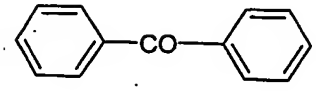
III

wherein at least some of the units I, II and/or III are functionalised to provide ion-exchange sites, wherein the phenyl moieties in units I, II, and III are independently optionally substituted and optionally cross-linked; and wherein m,r,s,t,v,w and z independently represent zero or a positive integer, E and E' independently represent an oxygen or a sulphur atom or a direct link, G represents an oxygen or sulphur atom, a direct link or a -O-Ph-O- moiety where Ph represents a phenyl group and Ar is selected from one of the following moieties (i)* or (i) to (x) which is bonded via one or more of its phenyl moieties to adjacent moieties

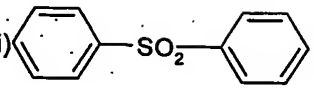
(i)*



(i)



(ii)



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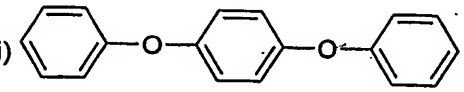
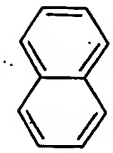
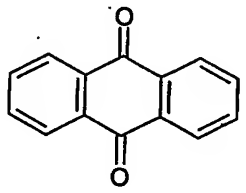


(iv)

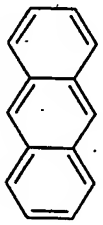
(v)



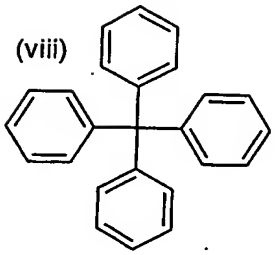
(vi)



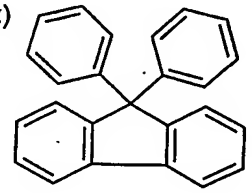
(vii)



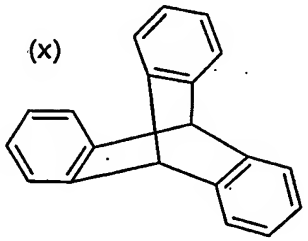
(viii)



(ix)

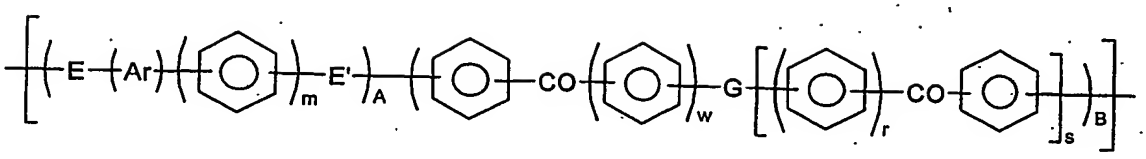


(x)



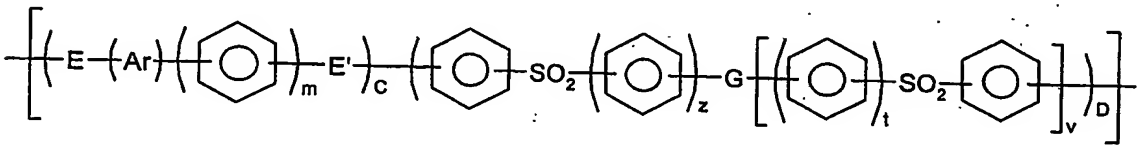
13. A method according to any preceding claim, wherein said polymeric material is sulphonated.

14. A method according to any preceding claim, wherein said polymeric material is a homopolymer having a repeat unit of general formula



IV

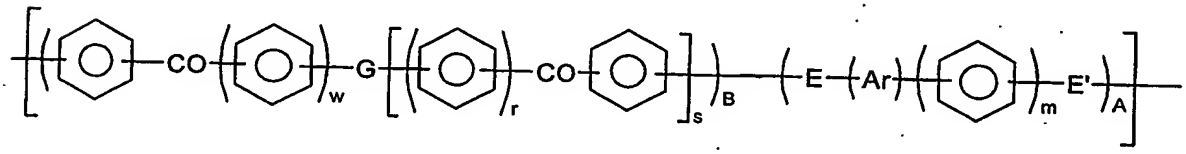
or a homopolymer having a repeat unit of general formula



V

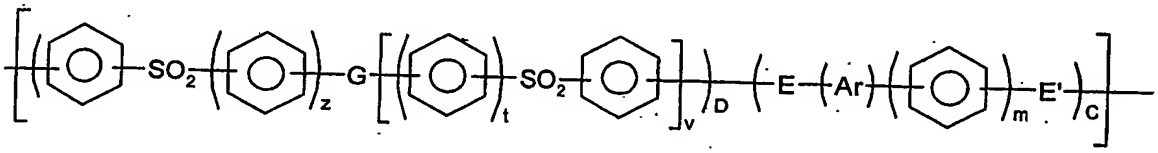
or a random or block copolymer of at least two different units of IV and/or V provided that repeat units (or parts of repeat unit) are functionalised to provide ion-exchange sites;

or a homopolymer having a repeat unit of general formula



IV*

or a homopolymer having a repeat unit of general formula



V*

or a random or block copolymer of at least two different units of IV* and/or V* provided that repeat units (or parts of repeat units) are functionalised to provide ion-exchange sites;

wherein A, B, C, and D independently represent 0 or 1 and E, E', G, Ar, m, r, s, t, v, w and z are as described in claim 12.

15. A method according to any preceding claim, wherein said ion-conducting polymeric material includes at least some ketone moieties in the polymeric chain.

16. A method according to any preceding claim, wherein said ion-conducting polymeric material includes -ether-biphenyl-ether-phenyl-ketone-units.

17. A polymeric material containing formulation (hereinafter "said pmc formulation") which comprises an ion-conducting polymeric material dissolved and/or dispersed in a solvent formulation wherein:

(a) said ion-conducting polymeric material includes:
(i) phenyl moieties;
(ii) carbonyl and/or sulphone moieties; and
(iii) ether and/or thioether moieties; and

(b) greater than 50 wt% of said solvent formulation is made up of water.

18. A polymeric material according to claim 17, wherein said PMC formulation includes at least 9wt% of said ion-conducting polymeric material.

19. A method of fabricating an article, the method including the step of contacting a member with a formulation as described in any preceding claim.

20. A method according to claim 19, which is used to deposit the polymeric material on said member.